

Upcoming CERES Validation on Nightglow Balloon Flight

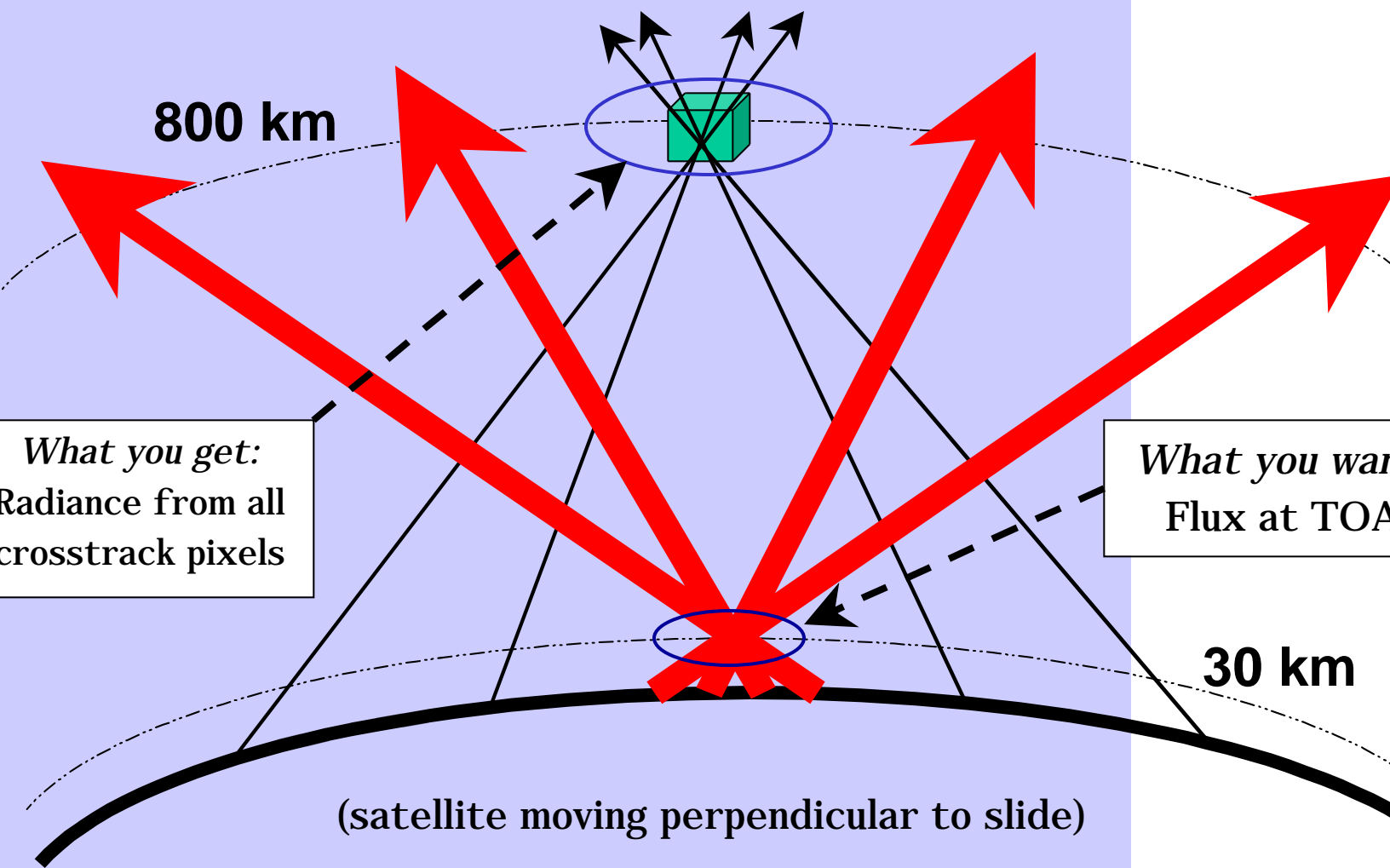
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Measuring TOA Radiative Flux from Space: The Angular Problem



With a Balloon at 35 km...

- you can just measure the outgoing flux directly!
- but until recently, commercial flux radiometers were biased and inaccurate...
- and we didn't have the funding to develop a custom set of radiometers for 35 km altitude work...
- but now, piggybacking on much recent work in ARM, at Langley and Goddard, at NOAA, and elsewhere, commercial flux radiometers are much better understood

Large- Balloon History

- Late 1700s, France: Montgolfier brothers
 - measured temperature profiles
- 1960: First NASA balloon experiment
 - communications satellite, Echo I
- 1985: Balloons in the clouds of Venus
- 1987: Balloon-borne sensors observed Supernova
- almost no Earth Science use (mainly stratos. chemistry)
 - flights too short
 - unsteerable

LDB/ULDB Balloon

Payload: up to 4000 kg

Volume: up to 1 million m³

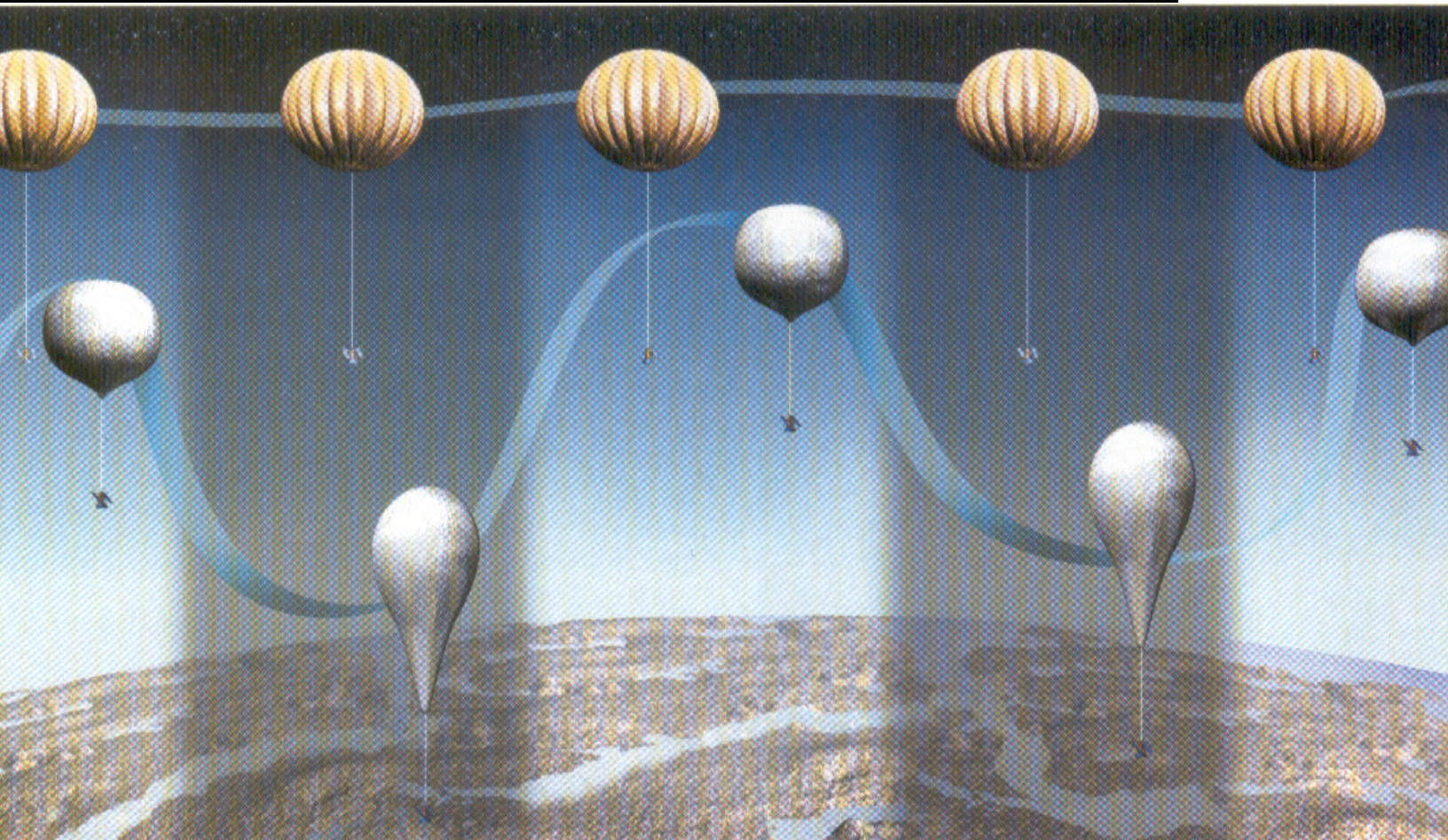
Long Duration Balloon: zero-pressure

- flight duration: 3-5 up to 30 days max
- altitude: 35-40 Km
- yo-yo's up and down due to solar heating, cooling
- at mercy of winds

Ultra Long Duration Balloon: super-pressure

- flight duration: 100-365 days
- altitude : 30-35 Km (no yo-yoing)
- steerable (in future)

Diurnal Altitude Change of LDB/ULDB



StratoSail® Trajectory Control System

(Patent Pending)



Nightglow LDB Test Flight

Even at night, the Earth's atmosphere glows from reflected starlight, moonlight, man-made ultraviolet (UV) light and molecular processes.

NIGHTGLOW!



Nightglow Gondola

May 2002



Nightglow Payload

Instrument	Contact Person	Configuration	Location	Physical Dimension (in)	Mass (lbs)	Power/TM Requirement	Thermal Requirement (temp range)	Power (Heat, E-deck only)
Nightglow Imager	Louis Barbier (PI) NASA GSFC	Overall Structure and Electronics Deck	Gondola Structure	80 x 68 x 24 (E-deck)	1600	Power=28 W Channels=	-40 C to +50 C	20
LIDAR	Louis Barbier	(1) Mirror/PMT, (2) Laser/electronics	(1) Outer frame (2) Under frame	(1) 24 x 24 x 60 (2) 9 x 8 diam.	180	Power= 8 W	-40 C to +50 C	0
TeLite	Jeff Houser NASA GSFC	(1) Electronics (2) Sensor	(1) E-deck (2) Solar array frame	(1) 14 x 14 x 12 (2) 5 x 4 x 4	25	Power= 3.05 W Channels= 3	-40 C to +50 C	3.05
Cloud Camera	Steve Stochaj New Mexico State Univ	Camera/Electronics	Under frame (in LIDAR laser vessel)	4 x 3 x 5 (in LIDAR laser vessel)	10	Power= 3 W Channels= ??	-40 C to +50 C	0
Sodium EP	Magdi Said NASA Wallops	(1) Electronics (2) 2 Antennae	(1) E-deck (2) Antenna farm	(1) 20 x 14 x 14	60	Power= 15 W Channels= 0	-40 C to +50 C	15
PS REx	Steve Katzburg NASA Langley	(1) Electronics (2) 2 Antennae (3) Solar panel??	(1) E-deck (2) Under frame & farm (3) LIDAR frame	(1) 15 x 11 x 7 (2) 7 x 7 x 1 (3) 25 x 20 x 1	30	Power= 15 W Channels= 0	-40 C to +50 C	15
CERES	Wenying Su NASA Langley	(1) Electronic (2) Receivers	(1) E-deck (2) Under frame	(1) 5 x 5 x 5	40	Power= 2 W Channels= ??	-40 C to +50 C	?
TOTALS					1945			50+

CERES Validation Package on Nightglow

- Pyranometers:
 - Eppley PSP (modified with dome thermocouples)
 - Kipp & Zonen CM22
- Pyrgeometers:
 - Eppley PIR
 - Kipp & Zonen CG4
- Data relay system
 - Nightglow's system
 - Our own system using Iridium
- Data storage
 - On board
 - Daily downlink

Radiometers for Nightglow



Modified PSP

thermistor



CM22



PIR

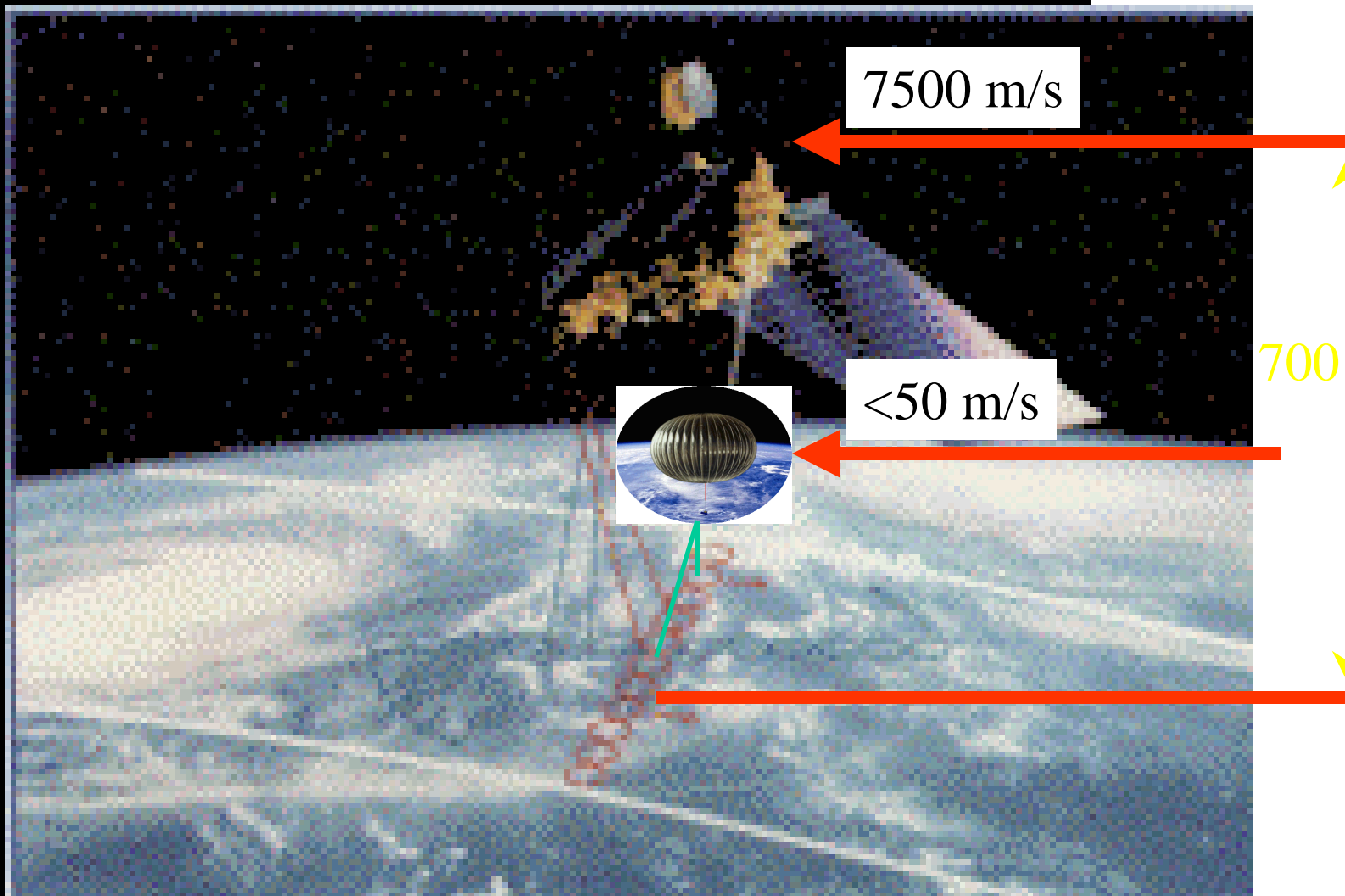


CG4

Launch and Package Recovery



Balloon and Satellite Footprint



CERES Overpass Estimation

- Each day four CERES and balloon overlapping opportunities (Terra + Aqua)
- If use CERES programmable azimuth plane scan mode, overlapping can be increased tenfold
- If calibrate balloon radiometers to CERES overpasses, can test 3-hourly guesstimates based on GOES

Schedule

- Integration: June 2002
- Launch: Dec 2002 from Alice Springs, Australia
- Data: May 2003